

## Disease Management for Vegetable Crops

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### **Project Objectives:**

Optimize management of diseases affecting vegetables grown on Long Island within organic as well as conventional production systems by:

- investigating pathogen biology, including sources.
- developing scouting protocols and action thresholds.
- evaluating control practices, including fungicides, resistant varieties, and integration of chemical and genetic control.

Examine impact on diseases of practices to improve soil health: annual compost amendments, reduced tillage, and clover living mulch.

Diagnose disease problems for growers.

Determine impact of ambient ozone on plant productivity.



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### **Project Summary:**

Research was conducted in 2006 to address the following diseases and topics:

**Powdery mildew of cucurbits:** Efficacy of registered conventional fungicides and experimentals, and of biopesticides and other products approved for organic production. Fungicide resistance occurrence in commercial fields, impact on disease control and management. Baseline sensitivity of the pathogen to new fungicides. Performance of resistant varieties of pumpkin, winter squash, yellow summer squash and zucchini.

**Downy mildew of cucurbits:** Efficacy of registered fungicides and experimentals.

**Bacterial wilt of cucurbits:** Susceptibility to wilt and attractiveness to cucumber beetles of powdery mildew resistant varieties. Performance of resistant cucumber varieties.

**Phytophthora blight of cucurbits and pepper:** Efficacy of registered fungicides, experimentals, and biopesticides. Control with fungicides applied to a resistant pepper variety. Performance of hard-rinded pumpkins.

**Powdery mildew and Septoria leaf spot of tomato:** Efficacy of products for tomatoes produced no-till in hairy vetch-rye mulch in the organic research block. Effect on yield and diseases of using soil mix amended with mycorrhizal fungi.

Snap bean and clover bioassay systems used to examine impact on plant productivity of ambient ozone.

Reduced tillage production system for pumpkin.

Clover grown as a living mulch between strips of black plastic mulch, a production system for improving soil health and suppressing weeds, was investigated using pumpkin.



Cucurbit powdery mildew.

**Project Justification:**

Powdery mildew is the most important disease affecting cucurbit crops every year throughout LI. Phytophthora blight is a devastating disease causing extensive losses in several crops on LI, especially pepper and cucurbits. Downy mildew has been developing much earlier in crop production and thus can cause significant losses. Cucurbits, especially pumpkin, are very important crops on LI. Foliar diseases are a common problem in organic tomatoes on LI. Ambient ozone reaches concentrations causing acute foliar injury to many crops each year on LI. Recognized need for practices to improve soil health.

**Impact to Industry:**

Research conducted in 2006 generated information growers can use in 2007.

Several varieties of pumpkin, winter squash, yellow summer squash, and zucchini were found to have a very good level of suppression of powdery mildew. There was a lot of variation particularly among pumpkin varieties with some claimed to have resistance becoming as severely affected as susceptible varieties. Horticultural characteristics and yield were assessed with input from some growers and marketers. Evaluating varieties for this disease is a need identified by growers because they feel this disease is becoming more difficult to control and resistant varieties is a preferred management tool.

Comparative efficacy data was obtained for registered fungicides (conventional, biopesticides, and approved for organic production) and those in development likely to be registered in the future for several important diseases. Results will be used to shape management recommendations.

Strains of the cucurbit powdery mildew fungus resistant to fungicides in three chemical groups (benzimidazoles, strobilurins, and demethylation inhibitors) were detected in commercial production fields at disease onset. This information was provided to growers with fungicide recommendations for 2006. Resistance to the first two groups was previously shown to be qualitative and to render these fungicides ineffective. Resistance to the third group is quantitative and has been at a moderate level for several years, with no impact on efficacy, thus these have been among the most effective fungicides, until 2006 when resistance reached a level that these became ineffective on some crops (e.g. pumpkin) but surprisingly not on another (butternut squash). Data on resistance and fungicide efficacy provides justification for requesting Emergency Exemption (Section 18) for a new fungicide in 2007.

Hard-rinded pumpkin varieties were demonstrated to be less susceptible to Phytophthora blight than conventional ones.

Pumpkins grown under reduced tillage yielded as well as those grown conventionally.



Septoria leaf spot on tomato.

**Project Team Members:**

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Phytophthora blight of pumpkin.